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Herbertia lahue (Iridaceae) and its allies

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Resumo. *Herbertia lahue* (Iridaceae) e seus táxons afins. *Herbertia lahue* é um taxón de difícil delimitação e os limites específicos e infraespecíficos são motivo de controvérsia entre diferentes autores. Neste estudo foram analisadas diferentes populações da espécie ao longo de sua área de ocorrência na América do Sul e também material cultivado proveniente do estado do Texas, Estados Unidos. Para a complementação de dados foram examinadas coletas botânicas depositadas em diferentes Herbário e devidamente mencionados no Material e Métodos. *Herbertia lahue, H. amoena* e *H. caerulea* são consideradas espécies segregadas. Lectótipos são designados para *Herbertia amoena, H. caerulea* e *H. lineata*. *Herbertia furcata* e *Ferraria plana* são considerados táxons duvidosos.
Palavras-chave: bibi, lahue, lahui, prairie-nymph, *Herbertia amoena, Herbertia caerulea,* Tigridieae.

Abstract. *Herbertia lahue* (Iridaceae) and its allies. *Herbertia lahue* is a taxon of difficult delimitation and the specific and infraspecific limits are reason of controversy among different authors. In this study, different populations of the species were analyzed along its range of occurrence in South America and also cultivated material from the state of Texas, United States. In order to complement the data, botanical collections deposited in different Herbaria and mentioned in Material and Methods were examined. *Herbertia lahue, H. amoena* and *H. caerulea* are considered segregated species. Lectotypes are designated for *Herbertia amoena*, *H. caerulea* and *H. lineata*. *Herbertia furcata* and *Ferraria plana* are considered doubtful taxa.
Key Words: bibi, lahue, lahui, prairie-nymph, *Herbertia amoena, Herbertia caerulea,* Tigridieae.

The first literary reference for *Herbertia lahue* was performed by the Jesuit priest, naturalist and historian Juan Ignacio Molina (1737-1829), which described *Ferraria lahue* Molina (1810: 110) in your famous work "Saggio sulla Storia Naturale del Chili", providing valuable data about ecology, and uses of this species (Molina 1810). Nevertheless, this name was forgotten for over a century. Thereby, *Herbertia lahue* was erroneously linked mainly with *Herbertia pulchella* Sweet (1827: pl. 222) and *H. caerulea* (Herbert 1840: pl. 3779) Herbert (1841: pl. 3862) during the 19th and early 20th century (Loddiges 1829, Herbert 1841, Klatt 1862, Klatt 1871, Baker 1877, Grisebach 1879, Philippi 1881, Baker 1892, Kuntze 1898, Wright 1907, and Bailey 1919).

Espinosa-Bustos (1922) rescues the species *Ferraria lahue,* proposing the name *Alophia lahue* (Molina 1810: 110) Espinosa-Bustos (1922: 9) for this taxon. In addition, he presents valuably comments about taxonomy, ecology, geographic distribution and uses. Later, Ravenna (1968) when studying live specimens of *Alophia lahue*, *A. amoena* (Grisebach 1879: 325) Kuntze (1898: 304), and *A. caerulea* (Herbert 1840: pl. 3779) Mottet (1892 [1893]: 117) (misidentified as *A. Drummondiana* [Graham 1836: 190] Foster [1945: 34]), recognized that all these taxa should be recognized as a single species, and the morphological variations among them interpreted at an infraspecific level, thus *A. amoena* and *A. drummondiana* were reduced to subspecies of *A. lahue.*

Goldblatt (1975) identifying the type of *Alophia* Herbert (1840: pl. 3779) as misinterpreted, re-established *Trifurcia* Herbert (1840: pl. 3779) as valid generic name, clarified the identity of *Cypella Drummondii* Graham (1836: 190) and *Herbertia Drummondiana* Herbert (1842: 65), and proposes six names required for species previously

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placed in *Herbertia* or in *Alophia*. The author follows the Ravenna's criterion in recognition of *Trifurcia lahue* in its broad sense, and establishes *Trifurcia lahue* (Molina) Goldblatt (1975: 384), *T. lahue* subsp. *amoena* (Grisebach) Goldblatt (1975: 384) and *T. lahue* subsp. *caerulea* (Herbert) Goldblatt (1975: 383). In sequence, Goldblatt (1978) reinstated *Herbertia* as a valid generic name, presenting a list of valid taxa, among them, *Herbertia lahue* (Molina) Goldblatt (1978: 379), *H. lahue* subsp. *amoena* (Grisebach) Goldblatt (1978: 379), and *H. lahue* subsp. *caerulea* (Herbert) Goldblatt (1978: 379).

The broad treatment for *Herbertia lahue*, containing three subspecies as firstly established by Ravenna (1968) and Goldblatt (1975, 1978), was followed by all later authors; however, the limits between these subspecies were not treated and, in general, the geographic distribution of each taxon was adopted as a criterion. Thus, the subsp. *lahue* spreading in south-central Argentina and central Chile, the subsp. *amoena* prospering in eastern and northeastern Argentina, Uruguay and southern Brazil, and the subsp. *caeruela* in the south of the United States and north Argentina (Ravenna 1989, Rodriguez-Ríos & Marticorena 2001, Ravenna 2003, Roitman & Castillo 2004, Roitman & Castillo 2008, Deble 2010, Deble & Alves 2013).

How is it possible to check, *Herbertia lahue* is taxonomically difficult to define, given its extensive geographic distribution, morphological variations, karyotype differences, and misinterpretation of the taxon along the time. In addition to these factors, there are a relatively large number of names that are linked to *Herbertia lahue* and, depending on the author, it can appear as synonyms or reduced to infraspecific categories. Thus, after collections and studies of different populations of *Herbertia lahue* and allies, throughout its geographic distribution, in southern Brazil, center-east and northeast Argentina, Uruguay, and southern Paraguay, together with the analysis of cultivated material from southern United States it was possible to verify the specific limits of this taxon and its allies.

Material and Methods

The research was carried out by field surveys (central, north and northeastern Argentina, southern Brazil, north and central Chile, and Uruguay), and analysis of herbarium specimens, including digital images (herbaria CTES, FCQ, HDCF, ICN, LSU, MVHM, MVM, MVFA, MVJB, NO, PACA, PY, SI, SMDB; acronyms according to Thiers 2021+). Collected specimens were deposited into PACA herbarium. The descriptions of the species are based on morphological characteristics of both the plants observed in natural habitat and on dry material. For the elaboration of the Figures were used photographs of specimens in nature or in cultivation and the boards were edited in the Adobe photoshop program, version 23.x. The morphological data mentioned in the text and the terminology used follow Goldblatt & Manning (2008) and Beentje (2010).

Taxonomic treatment

Herbertia amoena Grisebach, Abhandlungen der Königlichen Gesellschaft der Wissenschaften zu Göttingen 24: 325. 1879. ≡ *Alophia amoena* (Grisebach) Kuntze, Revisio Generum Plantarum 3 (3): 304. 1898. ≡ *Alophia lahue* subsp. *amoena* (Grisebach) Ravenna, Bonplandia [Corrientes] 2 (16): 284. 1968. ≡ *Trifurcia lahue* subsp. *amoena* (Grisebach) Goldblatt, Brittonia 27: 384. 1975. ≡ *Herbertia lahue* subsp. *amoena* (Grisebach) Goldblatt, Annals of the Missouri Botanical Garden 64: 379. 1978. Typus: ARGENTINA. Entre Ríos: Concepción del Uruguay, *ubique in campis*, *P.G. Lorentz 497 et 604*. Lectotypus (**hic loco designatus**!): ARGENTINA. Entre Ríos: Concepción del Uruguay, Ungemein häufig im Camp im ersten Frühling, September 1875, *P.G. Lorentz 497* (CORD00005727! isolectotypus GOET004138 photo!). Figure 1.

Geophyte up to 5–20 cm high above the soil, underground stem up to 2–5 cm long. Bulb depressed globose, 8–15 × 7–12 mm, prolonged in a short collar. Basal leaves green at anthesis 2–5; blades linear or narrowly linear-elliptic, plicate, apex acute, 6–20 × 0.2–0.4 cm wide. Flowering stem proximally foliose, 5–20 cm long, unbranched or 2–3-branched. Caulinar leaf in the proximal third of the stem, blades narrowly linear-elliptic, 4–9 × 0.2–0.5 cm, with up to ½ of total length sheathing the stem, base truncate, apex acute; the upper leaves gradually smaller, the most distal bracteiform, 3–4 × 0.3–0.5 cm, at the base plicate, concealing the peduncles of spathes. Spathes 1–3 per branch, fusiform, 3–4 × 0.2–0.3 cm, herbaceous, pallid-green, glandular stripes scattered, bivalved, two-flowered, pedunculate,

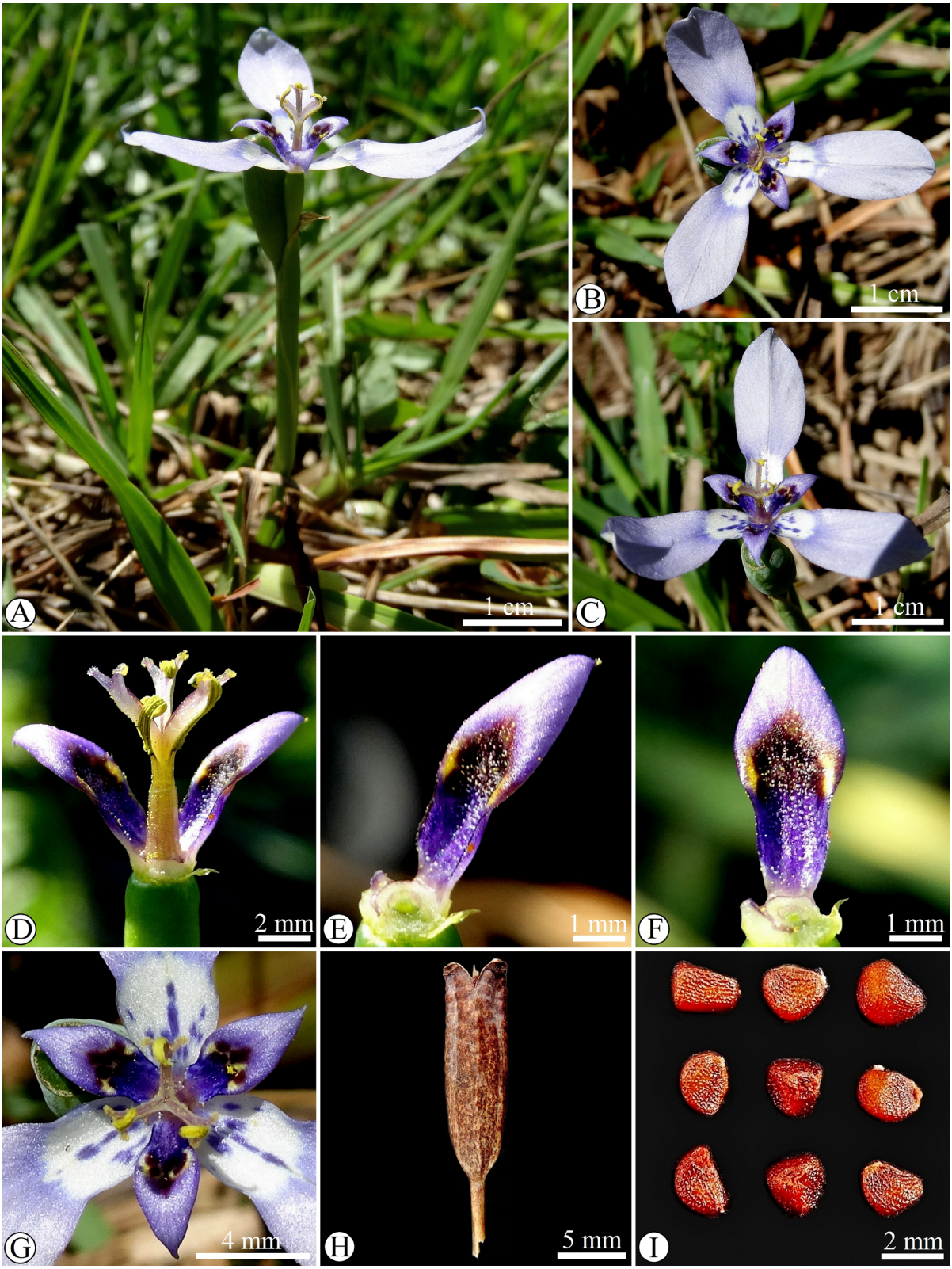

Figure 1. *Herbertia amoena*. A. Habit. B. Flower, upper view. C. Flower, lateral view D. Flower, showing style, stamens, and two inner tepals. E. Inner tepal, lateral view. F. Inner tepal, frontal view. G. Flower, upper view, showing the style branches, inner tepals and claws of outer tepals. H. Capsule. I. Seeds.

peduncles 1–5 cm long; lower valve 1.5–2.3 cm long, the upper 3–4 cm long, both with membranous edges and slightly straw-colored at apex; pedicel filiform, 2.5–4.5 cm long. Flowers predominately pallid lilac, radially symmetrical, 2–4 cm diameter. Tepals whorls sharply notably dissimilar, fused at the base for *ca.* 0.5 mm. Outer tepals oblanceolate, pandurate, 12–28 × 5–9 mm, concave at the base for 4–7 mm, one-celled lipid trichomes absent; blades 8–22 × 5–9 mm, lilac or whitish; claws broadly cuneate 4–7 × 3–4 mm opaline-white covered by lilac-blue stripes; inner tepals oblanceolate, 5–8 × 1.6–2.3 mm, pallid lilac-blue, base purplish-violet or reddish-purple, apex attenuate, acute or acuminate, reflexed, central concavity with a transverse medial stripe dark reddish-purple and yellow colored, which extending at the margin of the blade, one-celled lipidic trichomes abundant covering the central concavity. Staminal filaments entirely united for 3–5 mm long in a bottle shaped column; column pallid purple or pinkish white-cream, with purplish violet stripes in its proximal half; anthers linear, yellow, curved at dehiscence, 3.5–4.5 mm long; locules yellowish, pollen yellow. Ovary oblong, 5–8 × 1.8–2 mm. Unbranched part of style 3–5 mm long. Style branches pinkish-white, translucent, channeled, 2–3.5 mm long, ascendant, at apex bifid for 0.5–1 mm long, the divisions divergent, and straight, apically stigmatic. Capsules obovate to oblong, 18–24 × 6–9 mm. Seeds oblong to obconical, *ca.* 2 mm long, angular, reddish-brown, epidermis striate, faveolate.

Etymology— From Latim *amoenus* means pleasant, mild, and provably refers to delicate flowers of the species.

Specimens examined— ARGENTINA. Chaco: Dep. 1º de Mayo, Colonia Benitez, October 1938, *A.G. Schulz 9310* (CTES, p.p. mixed with *H. darwinii*). Corrientes: Capital, November 1984, *A. Schinini 25028* (CTES, SI); idem, November 1945, *A. Soriano 1713* (SI). Esquina, Estancia La Victoria, Reseva Zeni & Cia, *H.A. Keller 6247* (CTES). Estância Las Tres Marias, 12 October 1949, *T.M. Pedersen 437* (CTES, P). Monte Caseros, October 2014, *L.P. Deble et al. 14128* (PACA). Paso de los Libres, zone inondable près de la lagune Mansa, 2 November 1973, *N. Goodall & C. Tirel 60* (P). Misiones: Posadas, ruta 12, em direção Ituzaingó, 16 October 2013, *L. Eggers et al. 821* (ICN).
BRAZIL. Rio Grande do Sul: Barra do Quaraí, BR 472, km 640, Parque Estadual do Espinilho, 18 October 2009 *L. Eggers & T. Souza-Chies 521* (ICN). Entre-Ijuís, estrada secundária para sítio arqueológico de São João, 29 October 2009, *L. Eggers & T. Souza-Chies 535* (ICN). São Miguel das Missões, Sítio Arqueológico de São Miguel, 14 October 2005, *L. Eggers & T. Souza-Chies 111* (ICN). Uruguaiana, BR 472, aprox. 500m após passagem do Rio Itapitoca, 5 November 2012, *L.Eggers et al. 734* (ICN).
PARAGUAY. Itapúa: Bella Vista, 2 km S de Bella Vista, 7 October 1993, *A. Krapovickas & C.L. Cristóbal 44486* (CTES). Misiones: Santiago, Est. La Soledad, en prado, 17 October 1967, *A. Lourteig 2036* (P); 22 October 1959, *T.M. Pedersen 5185* (CTES, SI). Neembucú, Humaitá, 12 December 1950, *A.G. Schulz 7753* (CTES).
URUGUAY. Canelones: 27 November 1908, *M.B. Berro 5286* (MVM). Florida: Estancia Rincón de Sta Elena, io Yí ente arroyos Timote y Mansavillaga, 22 December 1938, *Gallinal et al. PE4028* (MVFA, p.p. mixed with *H. lahue*) Paysandú: Campo da Gruta de Padre Pio, 9 November 2013, *L. Eggers et al. 844* (ICN). Río Negro: Trés Bocas, rutas 24 y 25, campo arenoso arcilloso, blanqueal, 13 November 1991, *E. Marchesi s.n.* (MVFA 20645). Río Negro, Campo Cash, vecino a Viraroes, 20 November 1998, *E. Marchesi & M. Vignale* (MVFA 28592).

Doubtful Specimens— CHILE. VIII Región: Los Angeles, Antuco, 1km passado cruce a Tucapei, en suelo de lava pedregoso, 10 February 2000, *M. Muñoz 4047* (SGO). Without precise place, January 1882, *L. Jican s.n.* (SGO047300).

Phenology— Specimens with flowers and fruits can be found during September to December. The flowers open only one day, in the middle morning, and wither early afternoon. On cloudy days the flowers remain opened up to the middle afternoon.

Vernacular names and uses— bibi (Uruguay, northeast Argentina, southwestern Rio Grande do Sul state, Brazil), trindade (Rio Grande do Sul state, Brazil), flor-de-trindade (Uruguay, eastern and northeastern Argentina). The bulbs are used raw and cooked, they have a pleasant almond flavor. The leaves are tender and appreciated by cattle and others herbivorous.

Distribution and Habitat— *Herbertia amoena* is a common species growing mainly on sandy grasslands of Pampean and Mesopotamic phytogeographic provinces (following Cabrera 1976). However, this species extends its geographic range to parts of Chaquenha and Paranaense regions. The species is also found in areas of anthropic influence as squares and gardens. *Herbertia amoena* occurs sympatric with *Herbertia crosae* Roitman & Castillo (2004: 361) and *H. quareimana* Ravenna (1989: 55) on natural pastures in Barra do Quaraí municipality, in western Rio Grande do Sul state and western Artigas and Salto departments, northwestern Uruguay. *Herbertia amoena* grows in northeast Argentina and in western Rio Grande do Sul state

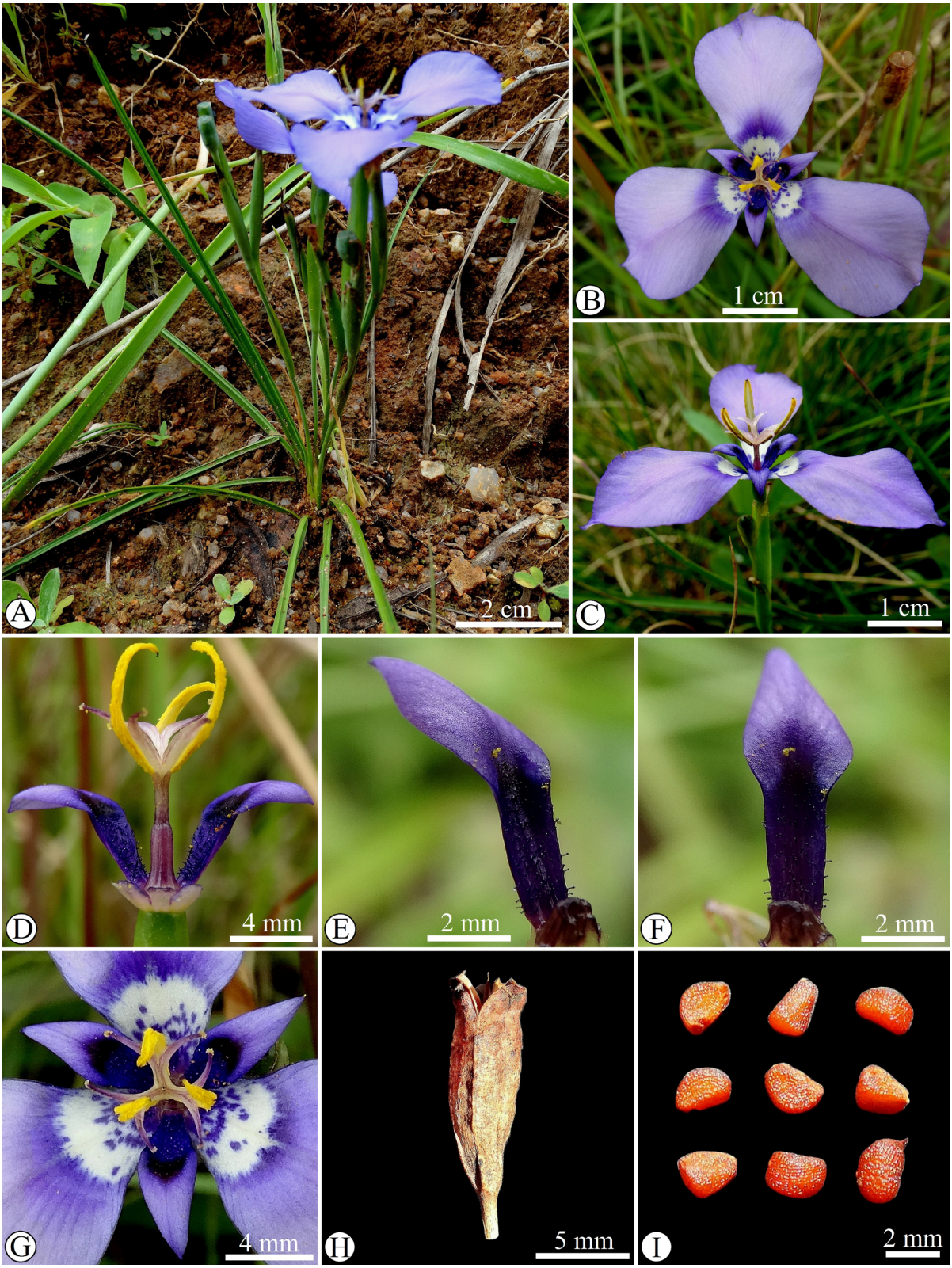

Figure 2. *Herbertia caerulea*. A. Habit. B. Flower, upper view. C. Flower, lateral view D. Flower, showing style, stamens, and two inner tepals. E. Inner tepal, lateral view. F. Inner tepal, frontal view. G. Flower, upper view, showing the style branches, inner tepals and claws of outer tepals. H. Capsule. I. Seeds.

in the same environments of *Herbertia Darwinii* and frequently both taxa are observed side by side. The species prospers along of all its geographic range with *Herbertia lahue*, and in dry material was observed vouchers of herbaria of both species mixed. During the review of herbaria, two materials for Chile were analyzed. Unfortunately, these exsiccates do not have flowers and the flower period is different. Therefore, both materials are presently recognized as doubtful of the taxon.

Conservation status— Not threatened.

Discussion— *Herbertia amoena* is easily recognized by its flowers with oblanceolate and small outer tepals, oblong ovary and secondary division of style branches short and straight. However, it can be confused with *Herbertia lahue*, but differs from this taxon by its two-flowered spathes (vs. one-flowered), by its shape and width of outer tepals (oblanceolate, 5–9 mm wide vs. obovate-oblong, obovate or obdeltate, 10–18 mm wide), by its inner tepals with central concavity and margin of the blade with a transverse medial stripe dark reddish-purple and yellow colored (vs. transverse medial stripe dark purplish-blue or dark blue) and by its smaller anthers, 3.5–4.5 mm long (vs. 5–7 mm long).

Herbertia caerulea (Herbert) Herbert, Botanical Magazine 67: pl. 3862. 1841. Bas. *Trifurcia caerulea* Herbert, Botanical Magazine 66: pl. 3779. 1840. ≡ *Alophia caerulea* (Herbert) Mottet, Dictionnaire Pratique d'Horticulture 1: 117. 1892[1893] <non *Alophia caerulea* (Vellozo) Chukr>≡ *Trifurcia lahue* subsp. *caerulea* (Herbert) Goldblatt, Brittonia 27: 383. 1975. ≡ *Herbertia lahue* subsp. *caerulea* (Herbert) Goldblatt, Annals of the Missouri Botanical Garden 64: 379. 1978. Typus: UNITED STATES. Texas: "species Texana a Drummond lectae floruit Spofforthiae". Lectotypus (**hic locus designatus!**): UNITED STATES. Texas: *T. Drummond* (P02065199!). Figure 2.

= *Herbertia Drummondiana* Herbert, Edward's Botanical Register 28: 65. 1842. <non *Alophia drummondii* (Graham) R. C. Foster>. Typus: UNITED STATES. Texas: "in ditione Texas, Drummond" (typus: not known).
= *Iris brachystigma* Scheele, Linnaea 22: 348. 1849. Typus: UNITED STATES. Texas: Piny Point, *Romer* s.n. (not localized, synonym according Goldblatt 1975: 383).
= *Herbertia Watsonii* Baker, Handbook of Irideae: 71. 1892. Typus: UNITED STATES. Texas: San Antonio, April 1844, *V. Havard s.n.* (holotypus GH 00031343!).

Geophyte up to 8–30 cm high above the soil, underground stem up 3–8 cm long. Bulb depressed globose, 13–20 × 11–20 mm, prolonged in a collar. Basal leaves green at anthesis 2–8; blades narrowly linear or narrowly linear-elliptic, plicate, apex acute, 8–35 × 0.3–0.8 cm wide. Flowering stem proximally foliose, 7–22 cm long, 2–3-branched. Caulinar leaf in the proximal third of the stem, blades narrowly elliptic-linear, 4–15 × 0.3–0.8 cm, with up to ½ of total length sheathing the stem, base truncate, apex acute; the upper leaves gradually smaller, the most distal bracteiform, 4–5 × 0.5–0.8 cm, at the base plicate, up to 1.2 cm wide, concealing the peduncles of spathes. Spathes 1–3 per branch, fusiform, 3.8–4.5 × 0.4–0.6 cm, herbaceous, pallid-green, glandular stripes scattered, bivalved, two-flowered, pedunculate, peduncles 3–8 cm long; lower valve 2.1–3.1 cm long, the upper 3.4–4.4 cm long, both with membranous edges and slightly straw-colored at apex; pedicel filiform, 3.3-4.5 cm long. Flowers predominately lilac or lilac-blue, radially symmetrical, 3.2–5.5 cm diameter. Tepals whorls sharply notably dissimilar, fused at the base for 0.5–0.8 mm. Outer tepals broadly obovate, obovate or obdeltate, not or slightly pandurate, (18) 21–38 × 11–23 mm, concave at the base for 5–7 mm, one-celled lipid trichomes scattered; blades 15–32 × 11–23 mm, lilac or lilac-blue; claws broadly cuneate 5–7 × 4–7 mm opaline-white covered by dark-blue or dark violet-blue dots; inner tepals oblanceolate or narrowly oblanceolate, 6–14 × 2–3 mm, blue or lilac-blue, base purplish-violet, apex long attenuate, acute or acuminate, reflexed, central concavity with a transverse medial stripe dark-violet or dark-violet blue, which extending at the margin of the blade, often violet or violet blue, with light-blue or white dots sometimes present. Staminal filaments entirely united for 5–7 mm long in a bottle shaped column; column pallid violet, with purplish violet stripes in its proximal half; anthers linear, yellow, curved at dehiscence, 6–9 mm long; locules yellowish, pollen yellow. Ovary obovate or oblong, 4.5–8.5 × 2–2.5 mm. Unbranched part of style 5–7.5 mm long. Style branches pinkish, channeled, 4–6 mm long, ascendant, at apex bifid for 1.5–2.5 mm long, the divisions divergent, and slight recurved, apically stigmatic. Capsules obovate to oblong, 8–18 × 5–8 mm. Seeds oblong to obconical, 2–2.5 mm long, angular, reddish-brown, epidermis striate, faveolate.

Etymology— From Latin *caeruleus* means sky-blue, referring to the perigone color.

Vernacular names and uses— prairie-nymph (United States), bibi and flor-de-quero-quero (Rio Grande do Sul state, Brazil). The bulbs are used raw and cooked, they have a pleasant almond flavor. The flowers are attractive and *Herbertia caerulea* is used sporadically as ornamental.

Specimens examined— ARGENTINA. Jujuy: Tumbaya, Volcan, 22 March 1979, *A.L. Cabrera et al. 30493* (SI). Tucumán, March 1919, ex Herbarium Corn. Osten *Schreiter 836* (MVM).
BRAZIL. Rio Grande do Sul: Bagé, BR 153, próximo ao trevo com a BR 293, 2 October 2002, *L.P. Deble et al. 699* (CNPO). Barra do Ribeiro, p. paleodunas, 3 November 2017, *L.P. Deble & F.S. Alves 17808* (PACA). Caçapava do Sul, 26 October 2018, *A.M. Cristiane et al. s.n.* (ICN200590); Guaritas, Pedra da Cruz, 27 October 2018, *A.M. Cristiane et al. s.n.* (ICN 200588); acesso ao parque Guaritas, 1 October 2009, *L. Eggers & T.T. Souza-Chies 465* (ICN). Encruzilhada do Su, BR 471, Km 236, 3 November 2010, *E.M. Stiehl-Alves 01* (ICN); no campo 3 November 2017, *L.P. Deble & F.S. Alves 17801* (PACA). Guaíba, BR 116, Km 308, Passo do Petim, Fazenda São Maximiano, 24 October 2003, *V.F. Kinupp et al. 2789* (ICN); Fazenda São Maximiano, 20 November 2004, *L. Eggers & T.T. Souza-Chies 82* (ICN). Lavras do Sul, estrada Rincão do Inferno, 6 November 2014, *T. Pastori et al. 155* (ICN). Piratini, BR392, 17 November 2006, *L. Eggers & T.T. Souza-Chies 183* (ICN); estrada secundária depois Cancelão antes de Capela, *L. Eggers & T.T. Souza-Chies 447* (ICN). Santana da Boa Vista, BR 153 sentido Bagé, 3 December 2017, *A.M. Cristiane* (ICN200586); estrada secundária Santana da Boa Vista-Encruzilhada do Sul, 1km BR392, 1 November 2013, *E.M. Stiehl-Alves et al. 73* (ICN).
UNITED STATES. Florida: Escambia County, 5 May 2009, *L. Walen s.n.* (FLAS225483). Louisiana: Calcasieu Parish, along roadside on Old Hwy 90, 18 April 1997, *R. Neyland 1273* (LSU). Crowley, along R.R. ca. 3.5 miles SW of Crowley, 7 May 1966, *B. E. Lemmon 1178* (LSU). East Baton Rouge Parish, 31 March 1975, *J. Lepine 7006* (LSU). Lafayette, 4 May 1966, *J.W. Thieret s.n.* (DUKE10058007); open ground behind Blackham Coliseum, 4 May 1966, *B.E. Lemmon 1149* (LSU). St. Bernard Parish, Jean Lafitte National Park and Preserve, 14 April 2005, *S.M. Gunn & D.M. Ferguson s.n.* (LSU00125263); Chalmette Nat. park, 8 April 1974, *P.K. Bretting 233* (LSU). West Feliciana Parish, without date, *L. Smith s.n.* (LSU00010642). Texas: without locality, *T. Drummond* (P02065199). Austin, in dry sand, 1 mile south of San Felipe in bog at edge of I. H.# 10. 26 April 1967, *J. R. Crutchfield 2508* (TEX, photo!); on Hwy 36, 7.1 miles north of its junction with Hwy 949 at Bellville, 3 April 1999, *J.J. Smith 34* (LSU). Colorado, 1 mi. south of Eagle Lake, 18 April 1958, *V.T. Harris* (FSU000142828). Harris County, 8 road miles NW of Dairy Ashford Road in Hounston, 2 April 1972, *K. Luke s.n.* (LSU00078528); west side of Hounston, 23 April 1977, *D.T. Macroberts 2251* (LSU). Huntsville, bare soil above roadshoulder, between highway and railroad, 25 April 1970, *C.A. Brown 21250* (LSU). New Braunfels, Comanche spring, April 1850, *Lindeimer 1204* (P). Palacios, 10 April 1936, *W.T. Penfound s.n.* (NO0043354). San Jacinto, 6.7 miles northeast on Forest Service Road 207 from its jct. with Farm Road 2693, 21 April 1989, *S. Jones & G. Jones 2477* (LSU). San Patricio, 7.5 m. N of Sinton on Hwy 77, directly in front of gate to Welder Wildlife refuge on east side of hwy, Matt W. 10 April 1993, *B.L. Turner 12* (TEX). Trinity Chica Community road, ca. 1 mi S of Chita Cemetery and TX 353, sandy soil, 21 April 1997, *F. González & D. Atha 3598* (TEX). Victoria, 5 mi. SW Victoria along U.S. rt. 59, 25 March 1972, *D. Allen-Tallman 38* (LSU).

Phenology— Specimens with flowers and fruits can be found during March-May in north Argentina and United States. The populations that grow in eastern Rio Grande do Sul state flowering and fruiting between October and November. The flowers open once one day, in the morning, and wither in the mid-morning. On cloudy days the flowers remain opened up to the midday.

Distribution and Habitat— *Herbertia caerulea* was described originally from Texas state, southern United States (Herbert 1840), but probably this species is a pre-Columbian introduction in North America, as firstly suggested by Ravenna (1968), Goldblatt (1975), and Goldblatt & Manning (2008). Ravenna (1968) indicated *Herbertia caerulea* (as *Alophia drummondii* subsp. *caerulea*) as native in northern Argentina. Most recently, Ravenna (2003) recognized *Herbertia caerulea* (as *Herbertia lahue* ssp. *caerulea*) as native in northern Argentina, being introduced in North America. According with the sampling examined, *Herbertia caerulea* occurs in disjunction on Pampean and Puneña/Pre-Puneña phytogeographic regions (following Cabrera 1976), prospering on natural grasslands and mountainous places in eastern Rio Grande do Sul state, Brazil, and in Jujuy, Salta and Tucumán Provinces, northern Argentina. In northern Argentina, this species occurs in the same environments of *Herbertia tigridioides*, making it difficult to differentiate them mainly in herbarium material. In southern United States (Florida, Louisiana and Texas States) was found on prairies. Throughout its area of occurrence, the species can occur in places with anthropic influence and also along paths.

Conservation status— Not threatened.

Discussion— *Herbertia caerulea* was treated as a subspecies of *H. lahue* a long time (see Ravenna 1968, Goldblatt 1975, Goldblatt 1978). However,

this taxon is easily distinguished from *Herbertia lahue* in several morphologic aspects, including its slender habit, its longer and narrower leaves, its bigger and two-flowered spathes, which borne in longer peduncles, and by its flowers with bigger perigone, with style branches longer and with secondary divisions longer and recurved. In fact, *Herbertia caerulea* is closer to *H. Darwinii* and *H. tigridioides* than to *Herbertia lahue*. However, *Herbertia caerulea* can be distinguished from *H. Darwinii* by its narrower leaves (0.3–0.8 cm wide *vs*. 0.8–1.6 cm wide), by its outer tepals without a yellow central stripe (*vs*. with a yellow linear stripe, surrounded by one-celled lipidic trichomes at the base of the blade), by its inner tepals oblanceolate or narrowly oblanceolate, 6–14 × 2–3 mm, with two medium blue and white or blue and purple dots on the margin (*vs*. elliptic-lanceolate or elliptic, 6–9 × 3–5 mm, with two medium yellow and purple dots on the margin), and by its style arms with shorter secondary divisions (1.5–2.5 mm long *vs.* 3–4 mm long). *Herbertia caerulea* differs from *H. tigridioides* by its outer tepals broadly obovate, obovate or obdeltate, 18–38 × 11–23 mm (*vs.* oblong or obovate-oblong, 16–30 × 9–14 mm), by its inner tepals oblanceolate or narrowly oblanceolate, 6–14 × 2–3 mm, acute or acuminate at apex, with two medium blue and white or blue and purple dots on the margin (*vs*. elliptic-lanceolate or elliptic, 5–7 × 2–3 mm, slightly acute or obtuse at apex, with a medium yellow and dark-purple stripe), and by its ascending style branches (*vs.* horizontal or slightly patent).

***Herbertia lahue* (Molina) Goldblatt**, Ann. Missouri Bot. Gard. 64: 379. 1978. Bas. *Ferraria lahue* Molina, Saggio sulla storia naturalle del Chili: 110. 1810. ≡ *Alophia lahue* (Molina) Espinosa-Bustos, Revista Chilena de Historia Natural 26: 9. 1922. ≡ *Trifurcia lahue* (Molina) Goldblatt, Brittonia 27: 384. 1975. Figure 3.

= *Herbertia lineata* Klatt, Abh. Naturf. Ges. Halle 15: 368. 1882. Typus: CHILE: Valdivia, "in pratis siccis leg. *C. Ochsenius*, W. Lechler, pl. chilensis 298 [398]" Lectotypus (**hic locus designatus!**): CHILE: Valdivia, "in pratis siccis pr. Valdivia, 28 November 1850, *W. Lechler 298* (P02066882!).

Geophyte up to 4–15 cm high above the soil, underground stem up to 1–5 cm long. Bulb depressed globose, 9–25 × 8–30 mm, prolonged in a short collar. Basal leaves green at anthesis 2–5; blades linear-lanceolate, linear-elliptic or elliptic-lanceolate, plicate, apex acute, 8–20 × 0.4–1.2 cm wide. Flowering stem proximally foliose, 4–10 cm long, unbranched or 2–3-branched. Caulinar leaf in the proximal third of the stem, blades elliptic-lanceolate, 6–12 × 0.6–1.2 cm, with up to ½ of total length sheathing the stem, base truncate, apex acute; the upper leaves gradually smaller, the most distal bracteiform, 4–5 × 0.3–0.5 cm, at the base plicate, concealing the peduncles of spathes. Spathes 1–3 per branch, fusiform, 3–4.5 × 0.5–0.6 cm, herbaceous, pallid-green, glandular stripes scattered, bivalved, one-flowered, pedunculate, peduncles 1–5 cm long; lower valve 1.9–2.8 cm long, the upper 3–4.5 cm long, both with membranous edges and slightly straw-colored at apex; pedicel filiform, 2.5–4.5 cm long. Flowers predominately light violet-blue or violet-blue, radially symmetrical, 2.5–5 cm diameter. Tepals whorls sharply notably dissimilar, fused at the base for *ca.* 0.5 mm. Outer tepals obovate-oblong, obovate or obdeltate, pandurate, 15–33 × 10–18 mm, concave at the base for 5–7 mm, one-celled lipid trichomes absent or few on the margin of the claws; blades 11–25 × 10–18 mm, violet-blue; claws broadly cuneate 5–7 × 3.5–4.5 mm opaline-white covered by violet-blue stripes and dots; inner tepals oblanceolate or elliptic, 4.5–7 × 1.4–3 mm, violet-blue, base purplish-violet or reddish-purple, apex attenuate, acute or acuminate, reflexed, central concavity with a transverse medial stripe dark purplish-blue or dark blue, which extending at the margin of the blade, one-celled lipidic trichomes abundant covering the central concavity. Staminal filaments entirely united for 3–5 mm long in a bottle shaped column; column pallid purple or pinkish, with purplish violet stripes in its proximal half; anthers linear, yellow, curved at dehiscence, 5–7 mm long; locules yellowish, pollen yellow. Ovary oblong-clavate, 7–11 × 1.8–2.4 mm. Unbranched part of style 3–5 mm long. Style branches pinkish-blue or pinkish-white, translucent, channeled, 1.5–4 mm long, ascendant or erect ascendant, at apex bifid for 0.1–1 mm long, the divisions straight, apically stigmatic. Capsules obovate to oblong, 18–34 × 5.5–9 mm. Seeds oblong to obconical, *ca.* 2 mm long, angular, reddish-brown or reddish-oange, epidermis striate, faveolate.

Etymology— "lahue" is the vernacular names of the plant in Chile (see Molina 1810, Espinosa-Bustos 1922).

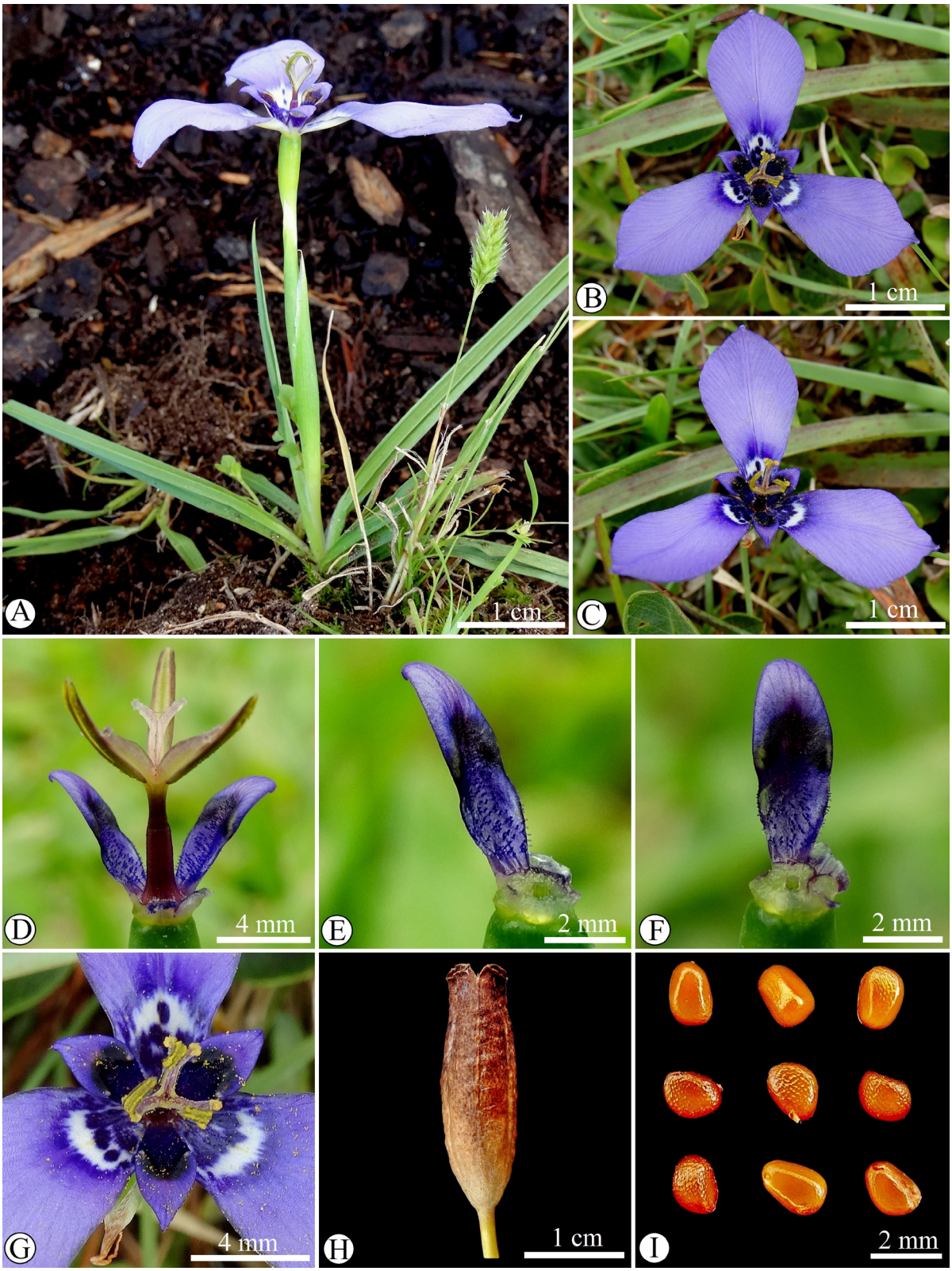

Figure 3. *Herbertia lahue*. A. Habit. B. Flower, upper view. C. Flower, lateral view D. Flower, showing style, stamens, and two inner tepals. E. Inner tepal, lateral view. F. Inner tepal, frontal view. G. Flower, upper view, showing the style branches, inner tepals and claws of outer tepals. H. Capsule. I. Seeds.

Specimens examined— ARGENTINA. Buenos Aires: Balcarce, Laguna La Brava, sierra, ladera oeste, 22 October 2010, *F.O. Zuloaga 12219* (SI). General Pueyrredón, Ea La Brava, Sierra Valdez, 18 November 1977, *O. Boelcke 764* (SI). La Plata, entre La Plata y Magdalena, 31 October 1948, *M.H. Humbert 21290* (P). Magdalena, ruta 36 y desvio a Bavio, 3 December 2009, *O. Morrone & M.A. Chemisquy 6269* (SI). Tandil, Cerro de La Cruz, La Cascada, 13 October 2009, *O. Morrone & L.M. Giussani 6237* (SI); Tandil, 15 November 1917, *C.M. Hicken s.n.* (SI25752); Tandil, Alto de Lucero, 24 November 1937, *N. Troncoso 1256* (SI). Corrientes: Santo Tomé, 23 km E. Ruta Nac. 14, camino a Colonia Garabi, 3 December 1970, *A. Krapovickas et al. 16968* (CTES).
BRAZIL. Without precise place, *F. Sellow 3024* (P); *F. Sellow s.n.* (P01793841, mixed with *Herbertia pulchella*); *F. Sellow s.n.* (P01793842). Paraná, Guarapuava, Campus CEDETEG, 5 November 2014, *A. Silverio 52* (ICN). Rio Grande do Sul: Amaral Ferrador, estrada secundária Encruzilhada do Sul, 3 December 2015, *L. Eggers & O. Chauveau 953* (ICN). Bagé, Santa Tecla, 1 November 1959, *A.R. Schultz 2109* (ICN); RS 473, estrada Bagé-Lavras do Sul, em frente a Fazenda Quebracho, 20 November 2012, *L. Eggers et al. 774* (ICN). Caçapava do Sul, 31 October 1959, *A.R. Schultz 2116* (ICN); Guaritas, Pedra da Cruz, 15 October 2017, *A.M. Cristiane et al. 07* (ICN 200589); idem, Pedra da Cruz, 15 October 2017, *A.M. Cristiane et al. 09* (ICN 200587); BR 153, direção BR290, campo seco, 20 November 2008, *L. Eggers & T. Souza-Chies 438* (ICN). Canguçu, 3 Distrito de Canguçu, Coxilha do Fogo, Cabanha Sobrado Branco, 18 October 2004, *F.J.M. Caporal s.n.* (ICN 142608); RS 265, 27 November 2004, *L. Eggers & T. Souza-Chies 32* (ICN). Jaquirana, RS 110, direção Bom Jesus, Várzea do Cedro, após entrada de Jaquirana, 10 November 2009, *L. Eggers & T. Souza-Chies 573* (ICN). Pelotas, BR116, Entrada estrada p. Santa Silvana, 25 October 2007, *L. Eggers & T. Souza-Chies 276* (ICN). Quaraí, Cerro do Jarau, na base do cerro 17 October 2004, *L. Eggers & T. Souza-Chies 60* (ICN). Rosário do Sul, BR 158, Km 514, 16 October 2009, *L. Eggers & T. Souza-Chies 493* (ICN). Santana do Livramento, Cerro Armour, 17 October 2009, *L. Eggers & T. Souza-Chies 504* (ICN); BR 158, Km 544, 16 October 2009, *L. Eggers & T. Souza-Chies 495* (ICN). São Borja, 15 October 2014, *T. Pastori et al. 132* (ICN). São Gabriel, BR 290, entre São Gabriel e Rosário do Sul, em frente ao Rest. Lancheria Paradouro 3, 15 October 2009, *L. Eggers & T. Souza-Chies 488* (ICN). São Lourenço do Sul, Centro Pio Ferreira, 15 September 2002, *G. Heiden 57* (ECT). São Miguel das Missões, próximo ao sítio Arqueológico de São Miguel, 17 October 2013, *E.M. Stiehl-Alves et al. 36* (ICN). Taquara, RS020, KM 4, 20 October 2006, *L. Eggers & T. Souza-Chies 162* (ICN); RS020, aprox. km 41, antes do riacho Passo dos Ferreira, 10 October 2007, *L. Eggers & T. Souza-Chies 211* (ICN). Torres, 3 November 1956, *A.R. Schultz 1361* (ICN). Viamão, P.E. de Itapuã, estrada Praia de Fora, 10 November 2005, *L. Eggers & T. Souza-Chies 135* (ICN); P.E. de Itapuã, Praia da Pedreira, 7 November 2008, *L. Eggers & T. Souza-Chies 417* (ICN). Santa Catarina: Rio Negrinho, Jardim Hantschel, 12 October 2016, *P. Schwirkowski 1905* (FURB). São Bento do Sul, Serra Alta, próximo a estrada Saraiva, 15 November 2015, *P. Schwirkowski 1342* (FURB); idem, estrada próximo a ASFA, 25 October 2018, *P. Schwirkowski 3127* (FURB).
CHILE. Without precise place and date, "mahue, ferraria, foliis alatis radice tuberosa", *M. Dombey* (P02066885). Concepción: Región Del Biobio, Peninsula de Tumbes, CODEFF Reserve at Bulnes, remnants of native coastal Forest, herb to 15 cm, flowers not seen, 20 January 1990, *M. F. Gardner & S. G. Knees 4372* (K); Bio Bio, de La Laja, Malacura, al lado sur del Rio Malacua en los lomajes, 23 December 1940, *C. Muñoz & R. Schick 1484* (SGO). Linares, Termas de castillo a 26 km a SE de Panse, 5 December 1967, *R. Wagenknecht 672* (SGO). Valdivia, "Sisyrinchium coeruleum Gay, in pratis rarissima" January 1835, *M.C. Gay* (P02066888, mixed with *Calydorea xiphioides*); idem January 1835*, M.C. Gay 256* (P02066889). Nuble, nea Bulnes, 19 November 1971, *K. Beckett et al. 4241* (SGO). Valdivia, in pascuis arenosis, 28 November 1850, *W. Lechler 298* (P02066879, P02066884); in pascuis, January 1855, *R.A. Philippi 320* (SGO, P02066881, P02066880 p.p.). Valdivia, San José de la Mariquina, November 1925, *P.A. Hollermayer 1215* (SI). Cautín, Temuco, 28 November 1947, *B. Sparre 3259* (SGO). Concepción, "enviroment de Conception" 1855, *P. Germain s.n.* (P02066878); in colibus, Cordillera de Chilean, 1855, *P. Germain s.n.* (SGO47292). VII Región, Tregualemu, 3 December 1989, *J. Solervicens s.n.* (SGO112527). IX Región, Temuco, Vegas de Chivilcán, November 1988, *M. González s.n.* (SGO113713)
URUGUAY. Without pecise place, 1899, *J. Arechavaleta* (MVM 18498). Canelones, La Torre, 27 November 1908, *M.B. Berro 5286* (MVFA). Cerro Largo: Camino a Sierra de Ríos, próximo a escuela 115, 23 October 1991, *G. Ziliani et al. s.n.* (MVFA 20298). Florida, Estancia Rincón de Sta Elena, rio Yí ente arroyos Timote y Mansavillaga, 22 December 1938, *Gallinal et al. PE4028* (MVFA, p.p. mixed with *H. amoena*). Lavalleja, ruta 40, Asperezas de Polanco, 6 December 1997, *D. Bayce et al. s.n.* (MVFA 28240); Cerro Verdún, 20 October 1962, *Laguardia et al. 2227* (MVFA). Maldonado, Cerro Pan de Azucar, 8 October 1939, *D. Legrand 1516* (MVM). Montevideo: Cerro, October 1926, *G. Herter* (MVM, P); October 1925, *G. Herter et al. 148* (MVM); without precise place, 1767, *Commerson* (P02066890); October 1876, *M. Fruchard s.n.* (P02065209); 9 November 1876, *M. Fruchard s.n.* (P02065208); September 1828, *M. Gay s.n.* (P02065207); cerro Maroma, 17 October 1875, *M. Fruchard* (P01793840). Soriano, Juan Jackson, Sta. Elena, 4 November 1934, *Gallinal et al. G29* (MVFA); Vera, October 1900, *M.B. Berro 442* (MVFA); La Colorada, 17 November 1947, *D. Legrand 2737* (MVM).

Phenology— Specimens with flowers and fruits can be found among September and January. The flowers open only one day, in the middle morning, and wither early afternoon. On cloudy days the flowers remain opened up to the middle afternoon.

Vernacular names and uses— bibi (Uruguay, Argentina, and southern Brazil), flor-de-trindade (Uruguay, Argentina and Chile), flor-de-quero-quero (easterm Rio Grande do Sul state, Brazil), lahue and lahui (Chile and central Argentina), trindade (southern Brazil). The bulbs are used raw and cooked, they have a pleasant almond flavor. The leaves are appreciated by cattle and others

herbivorous. In Chile and in central Argentina are used as forage.

Distribution and Habitat— *Herbertia lahue* is a common species growing on grasslands developed on different types of soils along of Chilense, Mesopotamic, Monte, Pampean and Paranaense phytogeographic provinces (following Cabrera 1976), but is particularly frequent in Chilense and Pampean regions. The species is also found in areas of anthropic influence as squares and gardens. *Herbertia lahue* occurs sympatric with *H. amoena* and *H. pulchella.*

Conservation status— Not threatened.

Discussion— *Herbertia lahue* is easily recognized by its one-flowered spathes, by its flowers with oblong ovary, and emarginated or shortly bifid secondary division of style branches. Even so, it can be confused with *Herbertia amoena*, but differs from this taxon by its one-flowered spathes (vs. two-flowered), by its shape and width of outer tepals (obovate-oblong, obovate or obdeltate, 10–18 mm wide *vs.* oblanceolate, 5–9 mm wide), by its inner tepals with central concavity and margin of the blade with a transverse medial stripe dark purplish-blue or dark blue (*vs*. transverse medial stripe dark reddish-purple and yellow colored) and by its bigger anthers, 5–7 mm long (vs. 3.5–4.5 mm long).

Doubtful taxa

Nemastylis furcata Klatt, Linnaea 31: 560. 1862. ≡*Calydorea furcata* (Klatt) Baker, Journal of Botany 14: 188. 1876. ≡ *Herbertia furcata* (Klatt) Ravenna, Onira Botanic Leaflets 10 (16): 55. 2006. Type: URUGUAY/BRAZIL: "auf der reise von Montevideo nach Porto Alegre" *F. Sellow 1108d, 1129* (P, not localized, I have examined some collections of *Sellow* at P Herbarium and also in others Herbaria, but none contain the indication of the numbers mentioned in the protologue by Klatt [1862], and these collections belong to *H. lahue* or *H. pulchella*).

Ravenna (2006) established *Herbertia crosae* as a synonym of *H. furcata* (Klatt 1862: 560) Ravenna (2006: 55), based in collections performed by Sellow deposited at P Herbarium. According to the author this species was firstly misplaced in the genus *Calydorea* Herbert (1843: 85) and subsequently erroneously linked to *Herbertia lahue* by himself in the Flora do Paraguay. However, the collections "Sellow 1108d and 1129", the numbers indicated by Klatt were not found in the herbarium P. The description indicates lanceolate-ensiform leaves […Foliis elongatis, lanceolato-ensiformibus…] and spathe one-flowered [… spatha pedunculata, unifora …]. Within the genus *Herbertia* these morphological features are found only in *Herbertia lahue*. In addition to these facts, as *Herbertia crosae* displays a very reduced distribution in the northwest of Uruguay and the extreme west of the Rio Grande do Sul state, Brazil, it is possible to verify the period in which Sellow traveled through the area of occurrence of *Herbertia crosae* and compare with its flowering and fruiting period, and following the chronology proposed by Urban (1893), Sellow was in the region of occurrence of *Herbertia crosae* during the summer-autumn, period in which the plant is in repose vegetative. Thus, I prefer to keep *Nemastylis furcata* as doubtful, but based in its description is a probable synonym of *Herbertia lahue.*

Ferraria plana Larrañaga, Escritos Damaso Antonio Larrañaga 2: 212. 1923. *"Caule recto simplici; foliis equitantibus nerviosis, petalis planis interioribus minimis lanceolatus (quadroplominoribus). Vis - vis. Oct. 30 1809."*
The description of the species is quite succinct, as can be seen above. However, the indication of flat tepals [… *petalis planis* ...] and the inner tepals about four times smaller than the outer ones […*quadroplominoribus* …] clearly indicate that it is a species of *Herbertia*, being probably *H. lahue* or *H. amoena*. Nevertheless, the absence of type forces me to regard the taxon as doubtful.

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